Fledermausbeobachtungen auf der Insel Helgoland

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Beobachtungen von Fledermäusen auf relativ weit der Küste vorgelagerten Inseln ohne eigene Fledermauspopulation sind, neben der faunistischen Bedeutung solcher Funde, vor allem hinsichtlich der Wanderungen dieser Tiere von besonderem Interesse.

Die etwa 1 km² große Insel Helgoland inmitten der Deutschen Bucht ist von der nächstgelegenen ostfriesischen Insel Wangerooge etwa 40 km, von der schleswig-holsteinischen Westküste, der Halbinsel Eiderstedt, etwa 50 km entfernt. Auf Helgoland auftauchende Fledermäuse müssen also einen mindestens 40—50 km langen, ununterbrochenen Über-Meerflug hinter sich gebracht haben. Haben sie die Insel erreicht, so stehen ihnen hier Höhlen und Spalten im stark zerklüfteten Buntsandstein zur Verfügung. Ebenso reichlich ist das Nahrungsangebot, da Helgoland eine arten- und individuenreiche Insektenfauna hat, der es auch an nachtaktiven Arten nicht fehlt (Caspers 1942; Kroll 1972; Vauk und Wittig 1971).

Erste Angaben über Fledermäuse auf Helgoland macht Dalla Torre (1889). Leider müssen seine Angaben mit einiger Vorsicht behandelt werden: „Im ganzen ergab sich aus der kritischen Durchsicht, daß Dalla Torre — so wertvoll viele Einzelangaben sind — nicht mehr als Grundlage für unsere Kenntnisse der Helgoländer Landfauna und die sich daraus ergebenden ökologischen Folgerungen dienen kann, da auf Grund einer Reihe von nachgewiesenen Fehlern die Sicherheit auch für die übrigen Angaben fehlt" (Caspers 1942). Diese Feststellung von Caspers gilt, wie wir sehen werden, auch hinsichtlich der Fledermäuse (siehe hierzu auch Heincke 1896). — Neuere Zusammenstellungen wurden von Mohr (1931a, b), Caspers (1942) und Kirk (1970) gegeben. In der folgenden Zusammenstellung sind alle bekannten Daten zusammengefaßt, einschließlich derjenigen, die ich in den Jahren meiner Tätigkeit auf Helgoland (1956—1973) sammelte.

Zwergfledermaus *Pipistrellus pipistrellus* (Schreber, 1774): Der Erstnachweis für diese Art wurde durch ein Exemplar erbracht, das P. Mangelsdorf am 18. 10. 1971 halbverwest im Unterland der Insel fand. Für die Bestimmung danken wir H. Reichstein, Kiel. Der Skelett-Beleg befindet sich in der Sammlung der Inselstation. Wahrscheinlich das gleiche Exemplar war von uns bereits einige Tage vorher fliegend beobachtet worden.

Vermutlich zur gleichen Art gehören zwei Fledermäuse, die ich am 24. 5. 1956 im Südwesten der Insel jagend beobachtete.

Rauhhautfledermaus *Pipistrellus nathusii* (Keyserling und Blasius, 1839): Caspers (1942) berichtet, daß R. Drost (der damalige Leiter der Vogelwarte Helgoland) am 3. 9. 1927 auf dem Dampfer „Adler" zwischen Amrum und Helgoland ein Exemplar gefangen habe. Dieses Stück soll nach Mohr (1931a) im Nordseemuseum auf Helgoland gewesen sein. Das Museum und seine Sammlungen wurden durch Kriegseinwirkungen zerstört. — Dies Helgoland-Vorkommen ist in der Verbreitungskarte bei van den Brink (1972) vermerkt.

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Breitflügelfledermaus *Vespertilio serotinus* (Schreber, 1774): Diese Art wurde von Selys Longchamps (1882) im September 1879 nachgewiesen (Caspers 1942; Kirk 1970) und ist in der Verbreitungskarte bei van den Brink (1972) eingetragen. Mohr (1931 b) nennt ohne nähere Angaben Belege u. a. von Helgoland.

Nordfledermaus *Vespertilio nilssonii* (Keyserling und Blasius, 1910): Dalle Torre (1889) nennt diese Fledermaus als „jeden Herbst auf dem Zuge ziemlich zahlreich". Er beruft sich dabei auf (anscheinend mündliche) Angaben von Gätke. Nun steht wohl fest, daß Gätke ein vorzüglicher Beobachter und leidenschaftlicher Sammler war, der sich nicht nur mit Ornithologie, sondern ebenso auch mit mammalogischen, entomologischen und botanischen Problemen befaßte und der außerdem fast sein ganzes Leben auf Helgoland zubrachte (siehe hierzu Gätke 1866, 1900; Stresemann 1967). Da die Nordfledermaus nach 1889 nun aber nie wieder festgestellt wurde, obgleich seit 1890 fast ständig Meeresbiologen und Ornithologen auf der Insel waren, muß man wohl annehmen, daß hier entweder ein Mißverständnis zwischen Gätke und Dalla Torre vorlag oder daß Dalla Torre eine vielleicht leichthin von Gätke gemachte Bemerkung sehr großzügig auslegte (s. o.). Es ist ferner festzustellen, daß auch keine andere Fledermausart auf Helgoland jeden Herbst „auf dem Zuge ziemlich zahlreich" zu beobachten ist. Vielmehr beziehen sich alle Nachweise auf Einzelstücke, die dann und wann auf der Insel erscheinen. — Dalla Torre gibt weiterhin an, daß er (wohl bei Gätke) „Exemplare eingesehen" habe. Möglicherweise stammten diese Exemplare aber gar nicht von Helgoland (Mohr 1931 b), zumal bekannt ist, daß Gätke auch Vogelbälge fremder Herkunft in seiner Sammlung verwahrte. Ich schlage daher vor, *Vespertilio nilssonii* als bisher nicht für Helgoland nachgewiesen anzusehen und auch den entsprechenden Hinweis bei van den Brink (1972) zu streichen.

Abendsegler *Nyctalus noctula* (Schreber, 1774): Von Mohr (1931 b) werden, ohne genauere Angaben, Belege von Helgoland genannt. Genauere Daten liegen dagegen von zwei Exemplaren aus neuerer Zeit vor. So fand im September 1967 ein Badegast einen Abendsegler in seinem Strandkorb hängend und brachte ihn zur Vogelwarte. Hier wurde er im Fanggarten (dem einzigen busch- und baumbestandenen Gelände der Insel) in einen Starenkasten gesetzt und war am nächsten Morgen verschwunden.

Ein weiterer Abendsegler wurde am 31. 5. 1973 an einem Fenster im obersten Stockwerk des Leuchtturms gefangen und uns übergeben. Wir beringten das Tier und setzten es wiederum in einen Starenkasten innerhalb unserer Anlagen. Auch diese Fledermaus war am folgenden Morgen nicht mehr in dem Kasten und wurde auch sonst nicht wieder beobachtet. Es ist wahrscheinlich, daß beide Exemplare die Insel noch in der Nacht verlassen haben.

Zusammenfassung

Auf Helgoland wurden bisher vier Fledermausarten nachgewiesen: *Pipistrellus pipistrellus*, *Pipistrellus nathusii*, *Vespertilio serotinus* und *Nyctalus noctula*. Bei allen Nachweisen handelt es sich um Einzelstücke. Regelmäßige Wanderungen von Fledermäusen wurden auf Helgoland nicht beobachtet.

Summary

Bat-records on the Island of Helgoland

Up to now four species of bats have been recorded on Helgoland: *Pipistrellus pipistrellus*, *Pipistrellus nathusii*, *Vespertilio serotinus* und *Nyctalus noctula*. As far as these species are concerned, they have been single samples. Regular migrations have not been observed on Helgoland.

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Further observations on the delivery behaviour of the common marmoset *(Callithrix jacchus)*

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Introduction

In a recent paper the delivery behaviour of the common marmoset *(C. jacchus)* has been discussed in detail (Rothe 1973). However, due to several methodological inadequacies, such as observation by light, several questions concerning the parturition process had to remain unanswered. Recently, we had the opportunity to attend two more deliveries; the results obtained allow for conclusions about at least four main questions: 1. Does the pregnant ♀ leave the other group members before parturition? 2. Which aspect of the behaviour of the pregnant ♀ could be taken to indicate imminent parturition? 3. Do group members take any notice of the birth; if so, how do they react to labour, to the parturition process itself, and to the newborn infant(s)? 4. Does the mother bite the umbilical cord before eating the placenta?

We are aware of some flaws in both our observations and the interpretations of the results. We therefore hope for more information on the delivery process in Callithricidae by other workers.

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Material and methods

Both ♀♀ (No. 11 and No. 12) came to our laboratories in 1968; they were already full-grown and had been recently caught in Brazil. Since then, each of them has given birth to more than 20 young (♀ No. 11 : 10 births; ♀ No. 12 : 9 births); in all, 30 of the young were brought up by their respective mothers. They remained with their parents in the two family groups of which No. 11 and No. 12, respectively, are the highest ranking females. Further details on the history of the two mothers and on the special rank-order relations in *C. jacchus* groups are given elsewhere (Rothe 1973).

On the basis of more than 30 previous pregnancies of five breeding females we were able to determine the day of an expected birth more or less accurately.

We started our observations at 08h00 in the morning, each female being checked every hour; from 18h00 on, observations were continuous. Street lighting from the windows was sufficient to guarantee exact observation; with ♀ No. 11, no extra light was turned on during the whole night; with ♀ No. 12, the light was switched on with the beginning expulsion of the fetuses.

Results

Month and hour of birth; inter birth interval; gestation period

Both deliveries took place in February at night; that is between 01h00 and 04h00 (♀ No. 11) and between 19h00 and 22h30 (♀ No. 12). The interbirth intervals were 155 and 156 days, respectively. We could not exactly determine the gestation period of ♀ No. 12 since this female was not observed during its postpartum estrus following the foregoing birth (August 30, 1972). Therefore, the day of conception is unknown. The pregnancy of ♀ No. 11 can be taken to have lasted 146 days, if we assume that the day of the previous postpartum estrus, when the first successful copulation (intromission and ejaculation) was noted, can be considered as the conception date (see also Rothe, in press.). No clear behavioural and bodily changes could be seen during the pregnancy of ♀ No. 11. ♀ No. 12, however, with the beginning of the 3rd month of gestation, became very quiet and almost apathic and its abdomen enlarged enormously (see also Lorenz and Heinemann 1967 for *Callimico goeldii)* (Fig. 1). Yet, as had already been observed during more than 30 other pregnancies, the degree of abdominal enlargement does not allow for definite conclusions as to the stage of pregnancy.

Fig. 1. Pregnant ♀ No. 12; one hour before the onset of the dilatation period

Preparation for birth

According to Naaktgeboren and Slijper (1970), the "preparation period" is characterized by a decrease in the animal's endocrine stability. Restlessness, nest-building behaviour, and the search for an adequate place to give birth are said to be among the detectable behavioural expressions prior to the onset of the first stage of labour. However, we have found that nest-building behaviour does not seem to be an element of

the behavioural repertoire of pregnant *C. jacchus* females. Only one reference to nest-building in *C. jacchus* has been found in the literature (Marik 1931).

♀ No. 11 left the common sleeping box 38 min, ♀ No. 12 1h14 min before the beginning of the dilatation period. None of the other members of their families paid attention to the females; they remained asleep in their boxes. Both females were extraordinarily restless; several times they fed, drank and defecated.

Dilatation period

According to Naaktgeboren and Slijper (1970) this period can be defined as the time span between the onset of the first stage of labour and the beginning of the expulsive pains. Yet, as we have already stated with other deliveries we observed, the beginning and the end of the dilatation period are very difficult to determine. In both females the first clearly detectable signs of the beginning of dilatation were: freezing of locomotion, lifting of the abdomen and of the tail, ruffling of the hair, closing of the eyes, heavy breathing, and adduction of the flanks (Fig. 2). This posture resembles the one the marmosets assume when constipated. We consider its first appearance as marking the beginning of the first stage of labour, as from this time on the labour pains could be detected by the observer.

The end of the dilatation period was marked by increased intensity of labour. Both females assumed a squatting posture (Fig. 3), typical for the pains of the expulsive stage of parturition. On the basis of the definition given above, the dilatation period lasted 37 min in ♀ No. 11 and 91 min in ♀ No. 12. During the whole dilatation period both females were extraordinarily restless. Very frequently they scratched and licked their genital regions. ♀ No. 12 evidenced some vaginal secretion, and towards the end of the dilatation stage she vomited a few times.

In the first third of the dilatation period, ♀ No. 12 experienced ten labour contractions, occurring in almost regular intervals of 3 min. In the second third, we counted two pains, and in the last we noted another ten, also occurring in intervals of about 3 min. The mean duration of the labour contractions was 2 s (range: 1.2—3.4 s). There is no significant difference as to the duration of labour in the first and second half of the dilatation period. With ♀ No. 11 we noted six labour pains which were spread regularly over the whole dilatation period. They lasted for about 2 s (range: 1.5—2.7 s) each.

Expulsive stage

The expulsive stage ranges from the onset of the expulsive pains to the complete expulsion of the fetuses (Naaktgeboren and Slijper 1970). The assuming of a squatting posture when in labour and the uttering of groans have been considered to indicate the beginning expulsion of the fetus(es).

1. *Duration of expulsion; frequency of expulsive pains; presentation and number of offsprings:* ♀ No. 11 gave birth to a single fetus; the expulsive stage lastig for 21 min. We counted nine expulsive pains of 5 s to 8 s duration each. The pains followed one another in almost regular intervals of about 1.3 min. After the fetus' head had been born, only one contraction of the uterus was necessary to expel the rest of the body; the infant was presented in vertex position, occiput posterior.

♀ No. 12 gave birth to triplets. The expulsion of all three fetuses required 46 min. There were 34 expulsive pains (see Table). With the first two infants (I 1, 12), the body (except for the head) was expelled by a single contraction of the uterus; I 1 was presented in vertex position, occiput anterior, and I 2 in vertex position, occiput posteriors. I 3 was born in breech position (Fig. 4); the expulsion of its body (up to

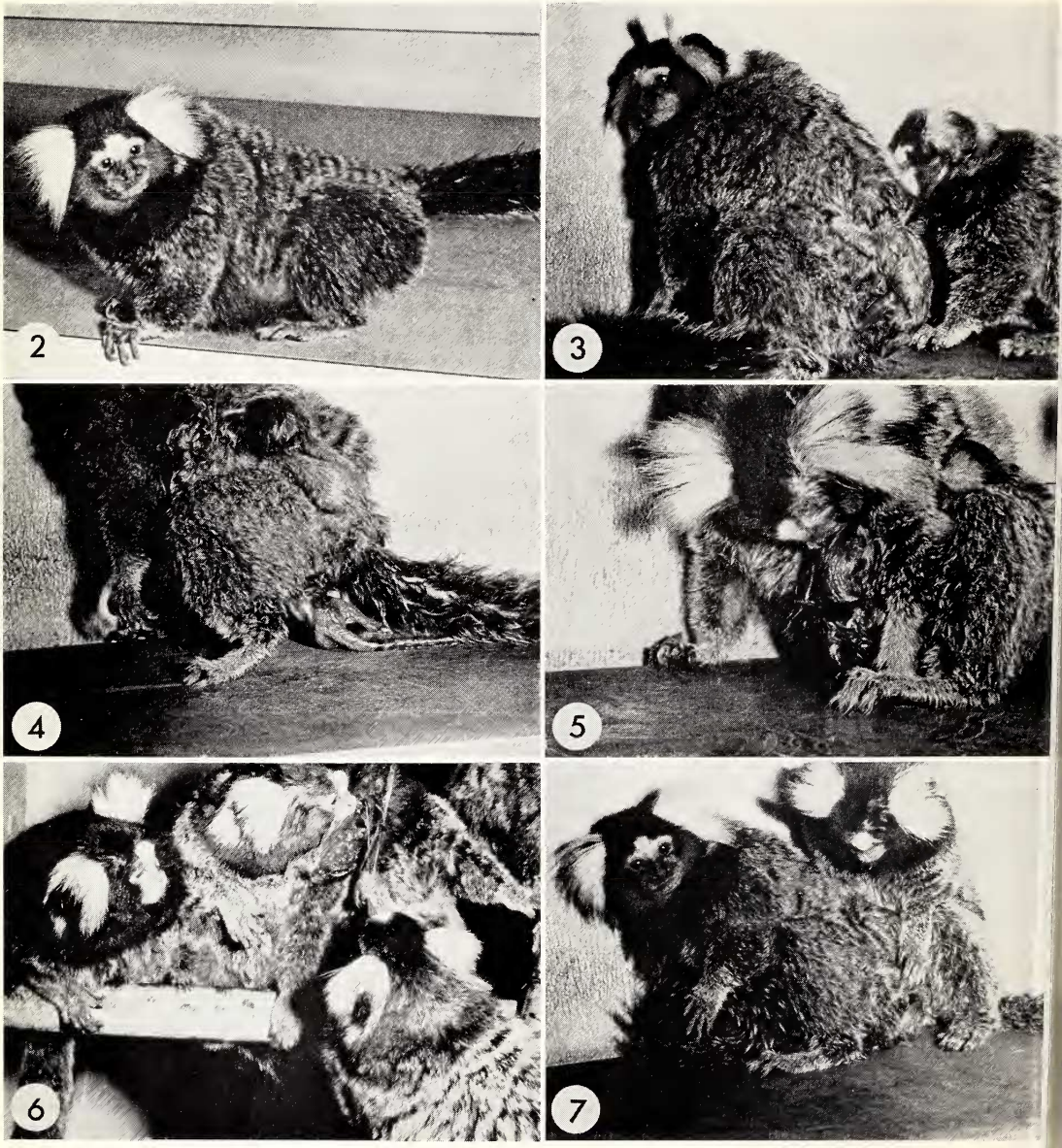

Fig. 2. Pregnant ♀ No. 12; beginning of the dilatation period — *Fig. 3.* ♀ No. 12 labouring in a squatting-posture during the expulsion of I 2; I1 is clinging at the mother's fur; α - ♂ at the right — *Fig. 4.* Expulsion of I 3; breech presentation; I 1 and I 2 are clinging at the mother's fur — *Fig. 5.* Mother (♀ No. 12) licks the head of I 2 immediately after its expulsion; I 1 is clinging at the mother's left nipple — *Fig. 6.* Group members eat the placenta — *Fig. 7.* Father tries to take the first-born infant (I 1)

the shoulders) required five expulsive pains, the infant's head following after another three contractions.

The expulsive pains lasted from 5.5 s to 9.4 s; the interval between pains was about 1.2 min. Vaginal outflow of blood occurred along with the expulsion of the placenta

(♀ No. 11) and shortly after the birth of I 2 (♀ No. 12), respectively. Both females licked their genitalia after each labour.

2. *Behaviour of mother and offspring immediately after birth:* The mothers' care for their infants shortly after birth was confined to frequent licking (Fig. 5). With the exception of I 3 (♀ No. 12), the neonates at one gripped the fur (grasping reflex of their hands and feet) of their mothers (Fig. 3). They reached the nipples unaided after 19 min (singleton of ♀ No. 11), 35 min (I 1 of ♀ No. 12), and after 21 min (I 2 of ♀ No. 12).

Table

Summary of data from two births in *Callithrix jacchus*

(Occ. ant. = occiput anterior; occ. post. = occiput posterior; sacr. post. = sacrum posterior)

	♀ No. 11	♀ No. 12
Foregoing deliveries	10	9
Month of birth	February	February
Hour of withdrawal from group members	01h16	19h03
Onset of dilatation period	02h30	19h41
Duration of dilatation period (min)	37	91
Number of contractions during dilatation period	6	22
Duration of expulsive stage (min) (I1/I2/I3)	21	16/20/10
Number of contractions during expulsive stage (I1/I2/I3)	9	16/8/10
Expulsion interval I1/I2, I2/I3	---	22,1
Number of offsprings	1	3
Presentation of I1	vertex, occ. post.	vertex, occ. ant.
I2	—	vertex, occ. post.
I3	—	breech, sacr. post.?
Duration of placental stage (min)	14	1
Duration of delivery (min)	98	161
Nipple contact after min (I1/I2)	19	35/21
Gestation period (days)	146	?
Interbirth intervall (days)	155	156

The last born fetus was not able to grip its mother's fur. It lay quite motionless between or next to her hindlegs. The infant breathed only sporadically. The mother licked I 3 carelessly and paid no further attention to it. I 3 did not survive.

Very often the mothers licked and scratched their genitalia. Both females ignored the umbilical cord(s) of their infant(s) which remained untouched until the eating of the placenta.

Placental stage; placentophagia

The placental stage is defined as the time which elapses from the complete expulsion of the fetus(es) to the complete expulsion of the placenta (Naaktgeboren and Slijper 1970). With ♀ No. 11, the placental stage lasted 14 min; the placenta was expelled by a single uterus contraction. The female licked its genital region and then started to eat the placenta and the newborn's umbilical cord of which only a short piece remained close to its body. Placentophagia and cleaning the perch from blood lasted 26 min. The infant remained motionless at the mother's right nipple.

With ♀ No. 12, the placental stage lasted less than 1 min; one weak contraction

expelled the placenta. The mother was very exhausted; at first, she paid no attention to the placenta even though she did not allow any other group member to touch or lick it. However, after 4 min one of her eldest daughters managed to seize the placenta and ran away with it so that the umbilical cords tore close to the infants' bodies. I 3 was dragged a short distance along the shelf and then fell to floor; it vocalized faintly, but was not approached by any of the group members. The placenta was eaten quite greedily by some of the eldest sons and daughters (Fig. 6). A few times ♀ No. 12 tried to get a piece of it but did not succeed.

Behaviour of group members during parturition

♀ No. 11 was alone during the whole delivery process. The other group members stayed in their sleeping boxes (about 2.5 m away from the birth place) and did not even react to the relatively loud groans of the labouring female. They did not notice the newborn infant until the morning at 06h00 when we switched on the lights (see also Hopf 1967 for *Saimiri sciureus*).

No attention was paid to ♀ No. 12 by the family until the light in the housing-room was switched on. Four minutes later, the eldest son approached his mother, licked some amnion-fluid from the sitting-board, and tried to sniff and to touch the mother's genital region. Within 2 min the α–♂ (= father) came to ♀ No. 12, sniffed at the amnion fluid at the base of the mother's tail, and at once started to copulate. She threatened and struck at him. The father stayed with No. 12 and later on tried to lick, to touch, and eventually to take the newborn infants (Fig. 7). Gradually, all other members of the family came to their parents and looked at the infant(s) with extreme curiosity (see also Rothe 1973). At first, the mother tried to keep father, sons and daughters away but later allowed them to sniff and touch the infants. Obviously the mother was too exhausted to keep off the family during the delivery process. We did not see any group member assist the mother during parturition (see Langford 1963).

Early postpartum period

♀ No. 12 was rather exhausted after parturition. She rested for another 18 min at the birth place and several times licked and scratched both her genitalia and the babies; only two of her eldest daughters were with her. Afterwards, she climbed to the feeding-board, drank eagerly, and then (22h54) fell asleep on one of the sleeping boxes; at this time she was alone again. The family members had disappeared into the sleeping boxes and continued sleeping after we switched off the lights. At 0h12 ♀ No. 12 awoke suddenly, stretched, and then fell asleep again until we switched on the lights at 06h00. During the whole night the babies rested at the mother's nipples. At 06h37 she tried to get rid of them. In the meantime, all family members had approached the mother and had touched and sniffed at the babies. Of all group members, the father was the least interested (see also Rothe 1973). It was the eldest son who took up the babies at 06h37. He carried them till 07h26. Then the mother took them back. At once they climbed to her nipples.

♀ No. 11 was in fairly good condition after birth. After she had lapped up all the blood from the perch and from her hands, she went to the feeding-board, drank, climbed to a sitting-shelf, and fell asleep (04h33). She awoke at 05h43. At 06h00, the highest ranking male of the group (= father) approached her; after an intense greeting ceremony, he tried to get the baby. At first the mother did not allow him to take the newborn infant but when she made efforts to get rid of it, it was he who got it. As in the other family, all group members showed great curiosity in the babies. In both families no aggressive behaviour towards the infants was observed.